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nologist in the country. Gentry records several species of lepidopterous larvæ as food of nestling Chimney Swifts and Nighthawks, when in fact the food of the young of these species does not vary appreciably from that of the adults and the latter take very few caterpillars.

Twenty species of insects are recorded as food of the Olive-sided Flycatcher, a rare species in eastern Pennsylvania, almost as long a list as the Biological Survey has been able to accumulate from an examination of 63 stomachs. Suspiciously full notes are given for such rare species (in Pennsylvania) as the White-winged Crossbill, Mourning, Connecticut, and Cerulean Warblers. We may inquire also into his statements as to the occurrence of the birds themselves. For instance he says (Vol. I, p. 311) of the White-crowned Sparrow, "from the 20th of April to the middle of May it congregates in flocks of a dozen or more . . . Whilst writing, May 4, vast numbers are daily observed within our gardens and the adjoining fields." The facts are that this sparrow is rare everywhere east of the Alleghenies, and probably never have vast numbers been seen about Philadelphia.

If this work of Gentry's were scientifically accurate, it would now rank as a classic. But regarded with suspicion at first and latterly ignored, its most obvious defect is that it looks too good. Gentry even claims to have identified the eggs and pupæ of certain species of *Cratonychus* (now *Melanotus*), a thing which is to-day impossible for even the best coleopterists.

The 'Life-Histories of the Birds of Eastern Pennsylvania' must be known then as a dangerous mixture of fact and unfact. Its accuracy in some respects gives it a deceptive appearance of verity, but with regard to the records of bird food it is certain that the only safe course is to regard them as almost entirely products of the author's imagination.—W. L. M.

African Economic Ornithology.—An important paper by Austin Roberts distinguishes that writer as a pioneer expounder of the 'Economics of Ornithology in South Africa.'¹ The author considers birds in relation to grain, fruit, poultry, and stock, and also gives a list of scavengers, and of birds suggested for protection. Mr. Roberts says: "Before the advent of white men in South Africa birds affected even the primitive agriculture of the natives; the patchy fields of corn had to be guarded against the same granivorous birds which now trouble us. But the conditions of that time differed widely from those obtaining now, as the grain fields were small and easily protected . . . Soon after the settlement of the country by white men a new feature arose in the introduction of cultivated fruit. Frugivorous birds, formerly dependent upon the precarious supplies of Nature, soon learned to appreciate the better quality and greater quantity placed within their reach, and it is not surprising that they forsook the

¹ Agr. Journ. Union of S. Africa, I, No. 3, April, 1911, pp. 352-369.

wild fruit when that in the orchards began to ripen." Most of the damage to grain is done by finches resident about the fields, and more than 16 species are mentioned, together with notes on their ravages. Some 25 to 30 species are listed as granivorous, but not as yet harmful, while four kinds of doves and pigeons, one crow and a crane are said to indulge in pulling newly sown grain.

The birds injurious to fruit comprise a greater variety including colies, bulbuls, starlings, glossy starlings, parrots, hornbills, white-eyes, sunbirds, and pigeons. Other fruit eaters mentioned are lorries, barbets, fruit pigeons and willow warblers.

The avifauna of South Africa is characterized by great variety of scavengers and rapacious birds. Among the enemies of poultry are 3 species of *Astur*, 2 of *Accipiter*, 2 of *Micronisus*, 3 of *Falco*, 1 *Buteo*, 2 *Spizaetus*, 1 *Hieraetus*, 1 *Aquila*, 1 *Milvus*, 1 *Melierax*, 1 *Circus*, 2 *Circaetus*, and 2 *Bubo*. Five or more other hawks and owls are mentioned as occasional depredators of the poultry yard. The damage is considerable at times, being most severe when the predatory birds are rearing their young. Mr. Roberts believes in protecting poultry, so far as possible, with wire netting, but remarks that this form of protection is not available for game. He states that "There is no means of protecting game from the attacks of vermin except by getting rid of the most destructive kinds, and the results of so doing will seriously affect other interests. At present the country is not in a position to undertake the destruction of any class of bird, and it will have to remain over until a sounder knowledge of their habits has been obtained."

The birds that have a beneficial relation to stock, that is, as tick destroyers, include the oxpeckers, one species of egret, one crow and one starling. Those troublesome to stock farmers, mainly because of attacks on lambs, are 4 eagles of the genera *Spizaetus* and *Aquila*, a lammergeier, a vulture, and a raven. The scavengers listed include 6 vultures of 5 different genera, 2 eagles, generically distinct, a kite, 2 crows and one stork.

In his remarks upon protection, the author presents some very sensible views regarding the tendency for economic values to vary locally, and the advantage of each district having a protected list of its own. He further says: "Only wholly useful birds should be protected, because farmers and others must be allowed to protect their own interests." The birds suggested for protection as friends of the stock farmer are oxpeckers and the buff-backed egret; as consumers of locusts and termites, pratincoles, black stork, white stork and wattled starling; as destroyers of small vermin and insects, kestrels, black-shouldered kite, owls (except the three largest species), swallows, swifts and wagtails; as being beautiful and likely to be exterminated, bluejays or rollers, and the crested crane. Mr. Roberts notes that the English sparrow, although introduced long ago, has not spread very far or become a nuisance, while the common starling of only 25 years standing has become injurious about Capetown.

Another paper on the food of African birds is of greatest interest in its bearing on the relation of birds to insects supposed to be protected by their color, or to show by their color that they are not edible. Mr. G. L. Bates in 'Further notes on the Birds of Southern Cameroon'¹ gives a résumé of the results of six years' field examinations of the stomachs of African birds. He found Coleoptera in 213 stomachs, Orthoptera in 177, ants in 57, other Hymenoptera in 8, scale insects in 32, bugs in 19, termites in 31, slugs and snails in 24, spiders in 85, millipeds in 20, and butterflies in none. Ants, particularly those of tropical countries, are classed by theorists as protected insects, and much is made of their so-called mimics among various other insect orders, yet ants rank fourth in importance in this list of bird foods. The theories that have been built up to explain the mimicking coloration of many butterflies as a result of natural selection absolutely require for their substantiation proof that birds regularly prey upon these insects. Evidence thus far urged as proof of this habit is largely based on experiments with captive birds. As the writer has pointed out in another place,² the results of such experiments have very little if any value as indicating behavior under natural conditions. Actual examinations of bird stomachs reveal butterflies in an exceedingly low proportion of North American birds, and the results of Mr. Bates's examinations during 6 years (in which time 178 stomachs were carefully examined with this particular point in mind), a larger body of good evidence than anyone else is able to produce for tropical birds, are worthy of the serious consideration of the selectionists who have postulated the necessary support for the mimicry theories in the heretofore almost wholly unknown, hence easily and agreeably hypothecated conditions of the tropics.—W. L. M.

Todd and Worthington's 'A Contribution to the Ornithology of the Bahama Islands.'—This paper³ is based upon a collection of 591 skins obtained by Mr. W. W. Worthington, December 28, 1908, to May 8, 1909, on the islands of New Providence, Great Inagua, Acklin, Watlings, Andros and Abaco, and later acquired almost in its entirety by the Carnegie Museum. The critical portion is by Mr. Todd and the 'Narrative and Field Notes' by Mr. Worthington. As the authors present their information in two entirely distinct lists in which the same species usually bears different numbers, an unnecessary burden is inflicted upon any one who may consult the paper. Eighty-four species are treated by Mr. Todd and one hundred and twenty by Mr. Worthington.

In his introduction Mr. Todd discusses the zoölogical relationship of the Bahamas both with relation to each other and to adjacent islands

¹ *Ibis*, 9th ser., V, No. 20, Oct., 1911, pp. 630-631.

² *Journ. Econ. Ent.*, 3, No. 5, Oct., 1910, pp. 437-438.

³ *A Contribution to the Ornithology of the Bahama Islands.* By W. E. Clyde Todd and W. W. Worthington. *Annals of the Carnegie Museum*, VII, Nos. 3-4. Issued, October, 1911.